EXHIBIT 14

FILE

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March 27, 2017

RE: Installation of radio base station antennas and associated equipment for the Verizon Wireless Personal Wireless Services facility to be located in the steeple of the Congregational Church of Grafton MA, 30 Grafton Common, Grafton, MA.

RECEIVED

AUG 29 2017

PLANNING BOARD
GRAFTON, MA

PURPOSE

I have reviewed the information pertinent to the proposed installation at the above location. To determine regulatory compliance, theoretical calculations of maximal radio-frequency (RF) fields have been prepared. The physical conditions are that Verizon Wireless proposes to mount their personal wireless services (PWS) directional panel antennas (a total of six) in the steeple of the Congregational Church of Grafton MA, 30 Grafton Common, Grafton, MA. The proposed installation will allow Verizon Wireless to continue deployment of their voice/data, Long Term Evolution (LTE), and Advanced Wireless Services (AWS) systems.

This report considers the contributions of all the proposed transmitters operating at their FCC-licensed capacity. The calculated values of RF fields are presented as a percent of current Maximum Permissible Exposures (%MPE) as adopted by the Federal Communications Commission (FCC),[i,ii] and those established by the Massachusetts Department of Public Health (MDPH).[iii]

SUMMARY

Theoretical RF field calculations data indicate the summation of the proposed Verizon Wireless PWS RF contributions would be within the established RF exposure guidelines; see Figure 3. This includes all publicly accessible areas, and the surrounding neighborhood in general. The results support compliance with the pertinent sections of the Massachusetts Department of Public Health regulations regarding PWS facilities.

Based on the results of the theoretical RF fields I have calculated, it is my expert opinion that this facility would comply with all regulatory guidelines for RF exposure with the installation of the proposed Verizon Wireless antenna and transmitter equipment.

Note: The analyses, conclusions and professional opinions are based upon the precise parameters and conditions of this particular site, **Church steeple at 30 Grafton Common, Grafton, MA**. Utilization of these analyses, conclusions and professional opinions for any personal wireless services installation, existing or proposed, other than the aforementioned has not been sanctioned by the author, and therefore should not be accepted as evidence of regulatory compliance.

EXPOSURE LIMITS AND GUIDELINES

RF exposure guidelines enforced by the FCC were established by the American National Standards Institute (ANSI) [iv] and the National Council on Radiation Protection and Measurement (NCRP).[v] The RF exposure guidelines are listed for RF workers and members of the public. The applicable FCC RF exposure guidelines for the public are listed in Table 1, and depicted in Figure 1. All listed values are intended to be averaged over any contiguous 30 minute period.

Table 1: Maximum Permissible Exposure (MPE) Values in Public Areas

Frequency Bands	Maximum Permissible Exposure (MPE)		
	Electric Fields	Magnetic Fields	Equivalent Power Density
0.3 – 1.34 MHz	614 (V/m)	1.63 (A/m)	(100) mW/cm^2
1.34 - 30 MHz	824/f (V/m)	2.19/f (A/m)	(100) mW/cm^2
30 - 300 MHz	27.5 (V/m)	0.073 (A/m)	0.2 mW/cm^2
300 - 1500 MHz	--	--	f/1500 mW/cm^2
1500 - 100,000	--	--	1.0 mW/cm^2

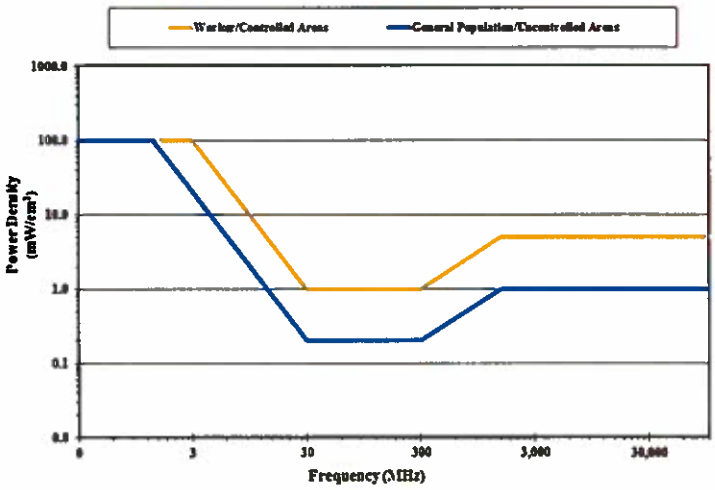


Figure 1: FCC Limits for Maximum Permissible Exposure (MPE)

NOTE: FCC 5% Rule – At multiple transmitter sites, actions necessary to bring the area into compliance with the RF exposure guidelines are the shared responsibility of all licensees whose transmitters produce RF field levels in excess of 5% of the applicable FCC MPEs.

Figure 2: Congregational Church of Grafton MA
30 Grafton Common, Grafton, MA
(Picture courtesy Google Earth©2017 and may not represent current conditions)

OBSERVATIONS IN CONSIDERATION WITH FCC RULES §1.1307(B) & §1.1310

Will it be physically possible to stand next to or touch any omnidirectional antenna and/or stand in front of a directional antenna? **NO**, access to the steeple ledge is restricted. The site will adhere to established RF safety guidelines regarding the PWS antennas, including appropriate signage, and restrict access to the ledge directly in front of the antennas to trained workers only.

THEORETICAL RF FIELD CALCULATIONS - GROUND LEVELS

METHODOLOGY

These calculations are based on what are called "worst-case" estimates. That is, the estimates assume 100% use of all transmitters simultaneously. Additionally, the calculations make the assumption that the surrounding area is a flat plane. The resultant values are thus conservative in that they over predict actual resultant power densities.

The calculations are based on the information contained in the Table 2 inventory:

- Effective Radiated Power (ERP).
- Antenna height (centerline).
- Antenna vertical radiation patterns; the source of the negative gain (G) values. "Directional" antennas are designed to focus the RF signal, resulting in "patterns" of signal loss and gain. These patterns (attached **APPENDIX A**) display the loss of signal strength relative to the direction of propagation due to elevation angle changes. The gain is expressed as "G^E".

Note: G is a unitless factor usually expressed in decibels (dB); where $G = 10^{(dB/10)}$.

For example: for an antenna *gain* of 3 dB, the net factor (G) = $10^{(3/10)} = 2$.

For an antenna *loss* of -3 dB, the net factor (G) = $10^{(-3/10)} = 0.5$.

To determine the magnitude of the RF field, the power density (S) from an isotropic RF source is calculated, making use of the power density formula as outlined in FCC's OET Bulletin 65, Edition 97-01: [vi]

$$S = \frac{P \cdot G}{4 \cdot \pi \cdot R^2}$$

Where:
- P → Power to antenna (watts)
- G → Gain of antenna
- R → Distance (range) from antenna source to point of intersection with the ground (feet)
- $R^2 = (\text{Height})^2 + (\text{Horizontal distance})^2$

Since: $P \cdot G = EIRP$ (Effective Isotropic Radiated Power) for broadcast antennas, the equation can be presented in the following form:

$$S = \frac{EIRP}{4 \cdot \pi \cdot R^2}$$

In the situation of off-axis power density calculations, apply the negative elevation gain (G^E) value from the vertical radiation patterns with the following formula:

$$S = \frac{EIRP \cdot G^E}{4 \cdot \pi \cdot R^2}$$

Ground reflections may add in-phase with the direct wave, and essentially double the electric field intensity. Because power density is proportional to the *square* of the electric field, the power density may quadruple, that is, increase by a factor of four (4). Since ERP is routinely used, it is necessary to convert ERP into EIRP; this is readily done by multiplying the ERP by the factor of 1.64, which is the gain of a half-wave dipole relative to an isotropic radiator. Therefore, downrange power density estimates can be calculated by using the formula:

$$S = \frac{4 \cdot (ERP \cdot 1.64) \cdot G^E}{4 \cdot \pi \cdot R^2} = \frac{ERP \cdot 1.64 \cdot G^E}{\pi \cdot R^2} = \frac{0.522 \cdot ERP \cdot G^E}{R^2}$$

To calculate the % MPE, use the formula:

$$\%\ MPE = \frac{S}{MPE} \cdot 100$$

The results of the calculations for the potential RF emissions resulting from the ***proposed*** **Verizon Wireless PWS** antennas are depicted in Figure 3 as plotted against linear distance from the base of the building in any direction. Note that the values have been calculated for a height of 6' AGL in accordance with regulatory rationale. Also depicted on the graph are values for a height of 16' AGL (height of a typical 2nd story). A logarithmic scale was used to plot the calculated theoretical %MPE values in order to compare with the MPE values of 100% (Public) and 500% (Worker), which are so much larger that they would be off the page in a linear plot. The curves are variable due to the application of the vertical radiation patterns.

ANTENNA INVENTORY

Table 2: *Proposed VERIZON WIRELESS* Antenna Inventory
The Congregational Church of Grafton MA
30 Grafton Common, Grafton, MA

Antenna Centerline (≈ AGL)	Number of Antennas per Sector	Typical Parameters: ERP & Tx Frequencies†	Typical Use ‡
70.1'	*2 each for 3 Sectors: A @ 35°, B @ 170°, C @ 305°*	*3035 watts @ 700 MHz*	*LTE-700*
		4038 watts @ 850 MHz	*CDMA*
		7573 watts @ 2150 MHz	*LTE-2100*
		4337 watts @ 1900 MHz	*LTE-1900*

Table Notes:
† Central frequencies –vs. – exact Tx frequencies used to account for multiple channels.
‡ Tx use (i.e. "duty cycle") assumed to be 100%; even for 2-way radio
Abbreviations:
AWS: Advanced Wireless Services
LTE : Long Term Evolution (aka "4G")
PCS: Personal Communication System

RESULTS

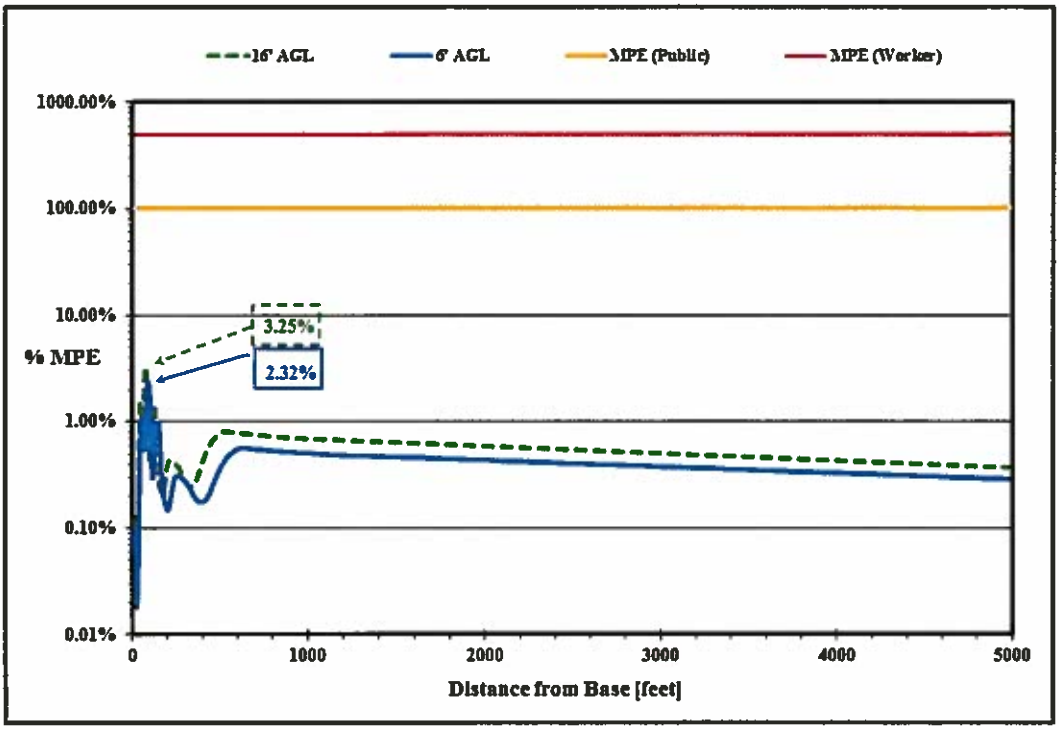


Figure 3: Theoretical Cumulative Maximum Percent MPE - vs. – Distance (*Proposed Verizon Wireless* RF Contributions)

THEORETICAL RF FIELD CALCULATIONS - WITHIN THE BUILDING

METHODOLOGY

In addition to intensity losses at angles away from the main beam (90° down), there are losses due to attenuation by building materials. A good approximation of these losses is -10 dB, or a factor of 1/10 ($10^{(-10/10)} = 0.1$). Thus, a modified equation to use for the area below the antennas is as follows:

$$S = \frac{4 \cdot [ERP \cdot 1.64] \cdot G^{(\text{antenna loss})} \cdot G^{(\text{building materials loss})}}{4 \cdot \pi \cdot R^2}$$

For the Verizon Wireless "LTE-700" transmitters:

$$S = \frac{4 \cdot 1.64 \cdot [3035 \text{ X } 2 \text{ watts} \cdot 10^{(-37.99/10)}] \cdot 10^6 \, \mu W/W) \cdot 10^{(-10/10)}}{4 \cdot \pi \cdot [(15 \text{ ft}) \cdot (30.48 \text{ cm/ft})]^2}$$

For the Verizon Wireless "CDMA" transmitters:

$$S = \frac{4 \cdot 1.64 \cdot [4038 \text{ X } 2 \text{ watts} \cdot 10^{(-37.99/10)}] \cdot 10^6 \, \mu W/W) \cdot 10^{(-10/10)}}{4 \cdot \pi \cdot [(15 \text{ ft}) \cdot (30.48 \text{ cm/ft})]^2}$$

For the Verizon Wireless "LTE-1900" transmitters:

$$S = \frac{4 \cdot 1.64 \cdot [4337 \text{ watts} \cdot 10^{(-34.03/10)}] \cdot 10^6 \, \mu W/W) \cdot 10^{(-10/10)}}{4 \cdot \pi \cdot [(15 \text{ ft}) \cdot (30.48 \text{ cm/ft})]^2}$$

For the Verizon Wireless "LTE-2100" transmitters:

$$S = \frac{4 \cdot 1.64 \cdot [7573 \text{ watts} \cdot 10^{(-34.03/10)}] \cdot 10^6 \, \mu W/W) \cdot 10^{(-10/10)}}{4 \cdot \pi \cdot [(15 \text{ ft}) \cdot (30.48 \text{ cm/ft})]^2}$$

The total is 0.17% MPE or more than 500 times below the FCC exposure guidelines.

CONCLUSION

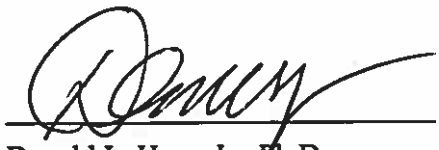
Theoretical RF field calculations data indicate the summation of the proposed Verizon Wireless PWS RF contributions would be within the established RF exposure guidelines; see Figure 3. This includes all publicly accessible areas, and the surrounding neighborhood in general. The results support compliance with the pertinent sections of the Massachusetts Department of Public Health regulations regarding PWS facilities.

The number and duration of calls passing through PWS facilities cannot be accurately predicted. Thus, in order to estimate the highest RF fields possible from operation of these installations, the maximal amount of usage was considered. Even in this so-called "worst-case," the resultant increase in RF field levels are far below established levels considered safe.

Based on the results of the theoretical RF fields I have calculated, it is my expert opinion that this facility would comply with all regulatory guidelines for RF exposure with the installation of the proposed Verizon Wireless antenna and transmitter equipment.

Feel free to contact me if you have any questions.

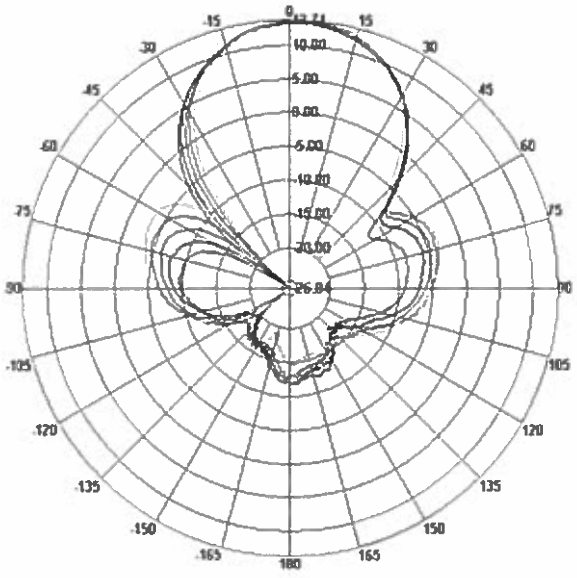
Sincerely,



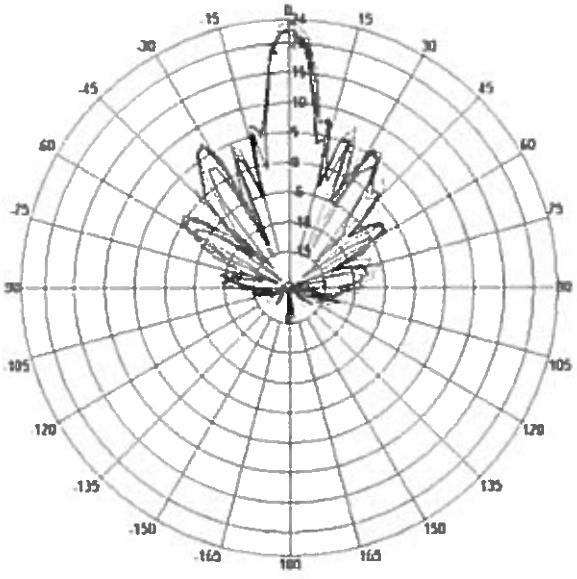
Donald L. Haes, Jr., Ph.D

Certified Health Physicist

APPENDIX A



Horizontal plane radiation pattern



Vertical plane radiation pattern

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STATEMENT OF CERTIFICATION

1. I certify to the best of my knowledge and beliefs, the statements of fact contained in this report are true and correct.

2. The reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions, and are personal, unbiased professional analyses, opinions and conclusions.

3. I have no present or prospective interest in the property that is the subject of this report and I have no personal interest or bias with respect to the parties involved.

4. My compensation is not contingent upon the reporting of a predetermined energy level or direction in energy level that favors the cause of the client, the amount of energy level estimate, the attainment of a stipulated result, or the occurrence of a subsequent event.

5. This assignment was not based on a requested minimum environmental energy level or specific power density.

6. My compensation is not contingent on an action or event resulting from the analyses, opinions, or conclusions in, or the use of, this report.

7. The consultant has accepted this assessment assignment having the knowledge and experience necessary to complete the assignment competently.

8. My analyses, opinions, and conclusions were developed and this report has been prepared, in conformity with the *American Board of Health Physics* (ABHP) statements of standards of professional responsibility for Certified Health Physicists.

Date: March 27, 2017

Donald L. Haes, Jr., Ph.D

Certified Health Physicist

ENDNOTES

[i]. Federal Register, Federal Communications Commission Rules; *Radiofrequency radiation; environmental effects evaluation guidelines* Volume 1, No. 153, 41006-41199, August 7, 1996. (47 CFR Part 1; Federal Communications Commission).

[ii]. Telecommunications Act of 1996, 47 USC; Second Session of the 104th Congress of the United States of America, January 3, 1996.

[iii]. 105 CMR 122.000: Massachusetts Department of Public Health, *Non-Ionizing Radiation Limits for: The General Public from Non-Occupational Exposure to Electromagnetic Fields, Employees from Occupational Exposure to Electromagnetic Fields, and Exposure from Microwave Ovens.*

[iv]. ANSI/IEEE C95.1-1999: American National Standard, *Safety levels with respect to human exposure to radio frequency electromagnetic fields, from 3 KHz to 300 GHz* **(Updated in 2010).**

[v]. National Council on Radiation Protection and Measurements (NCRP); *Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields*, NCRP Report 86, 1986.

[vi]. OET Bulletin 65: Federal Communications Commission Office of Engineering and Technology, *Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields*; Edition 97-01, August 1999.